Biosafety Decisions in the Clinical Microbiology Laboratory

2009

Biological Safety

The application of combinations of laboratory practice and procedure, laboratory facilities, and safety equipment when working with potentially infectious microorganisms.

"Lab Safety in the Era of Bioterrorism", CDC/NLTN, January 2003

Standard Microbiological Practices

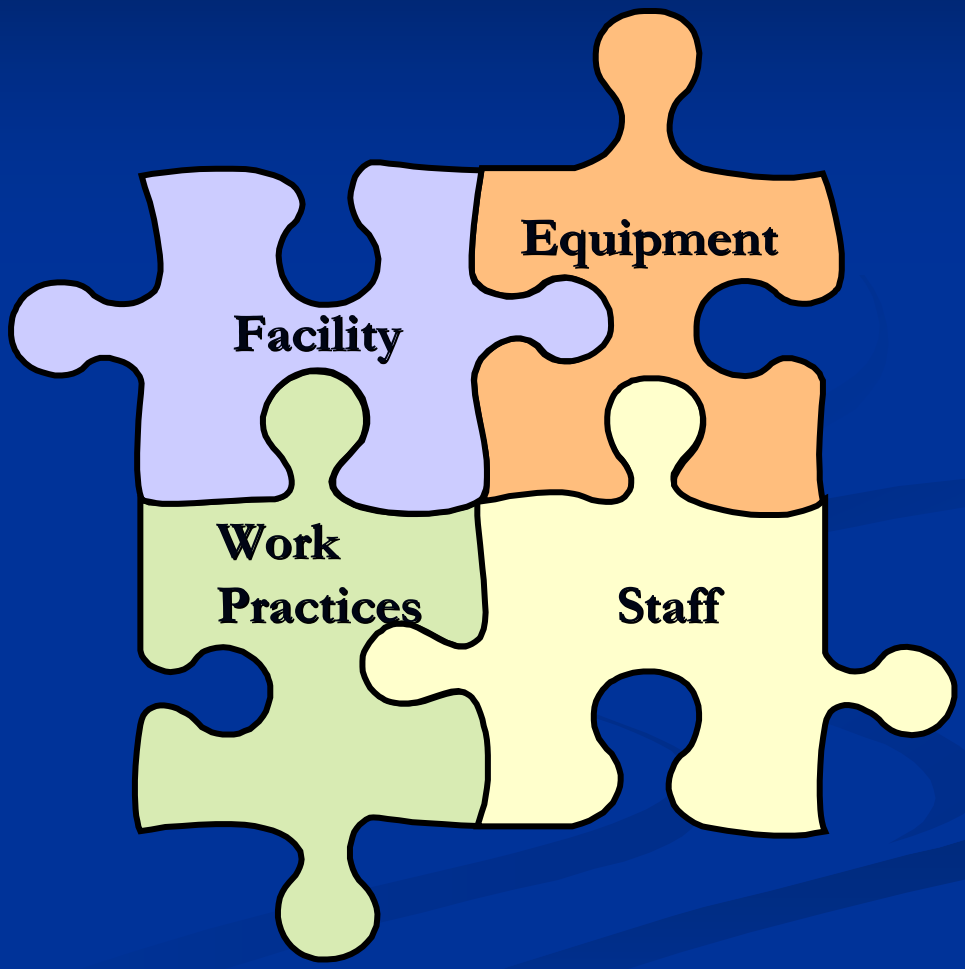
- Inform
- Restrict
- Prohibit
- Protect
- Disinfect
- Manage

Biosafety Levels 2 and 3

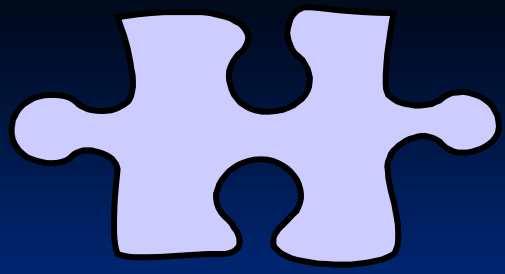
- BSL 2: Suitable for work involving agents of moderate potential hazard to personnel and the environment with a transmission mode of direct contact
- BSL 3: Suitable for work involving infectious agents which may cause serious, or potentially lethal, disease and can be transmitted by the inhalational route

Biological Safety Levels 2 & 3

The pieces of the puzzle

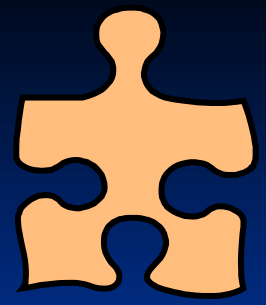


Facility



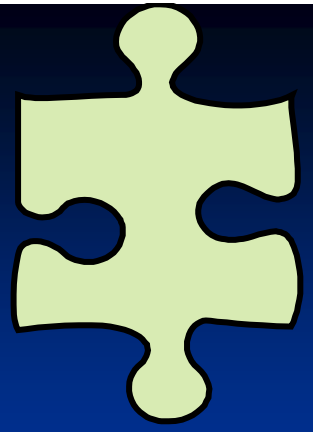
- **BSL 2**
  - Door
  - Sink
  - Lab design
  - Ventilation
  - Biosafety cabinet
- **BSL 3**
  - BSL 2 +
  - Ventilation must be verified
  - Lab enhancements

Equipment



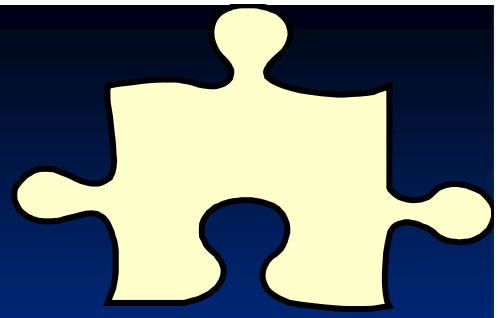
- **BSL 2**
  - Biosafety Cabinet
  - Centrifuge
  - Personal Protective Equipment
- **BSL 3**
  - BSL 2 +
  - Required presence of BSC
  - PPE based on risk
  - Safety cups for centrifuges

Work Practices



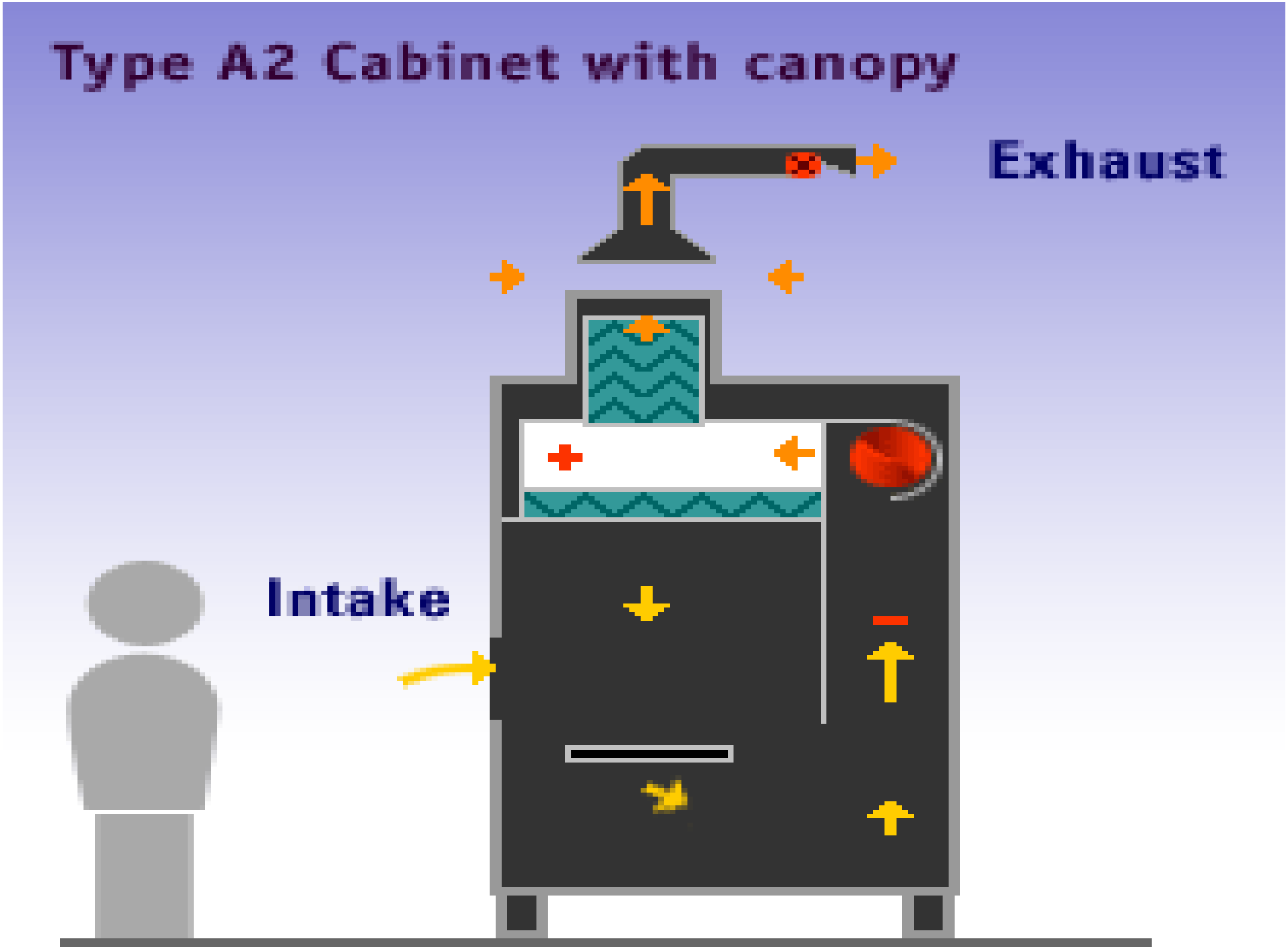
- **BSL 2 & BSL 3**
  - Utilize safety equipment
  - Maintain safe working environment
  - Use correct PPE

Staff



- **BSL 2**
  - Educate
  - Train
  - Competency
  - Medical surveillance
- **BSL 3**
  - **BSL 2 +**
  - Additional emphasis on all 4 components

Biosafety Cabinets


Type A2 Cabinet with canopy
Exhaust
Intake

Class II BSC Safe Operations

- Always enter straight into cabinet – no sweeping motions
- Perform work in a slow, methodical manner
- Do not "fill up" cabinet or block the back or front grill
- Work 4 -6 inches within cabinet
- Do not disrupt air curtain by rapid movement of any kind – including walking!

BSL 2 Lab / BSL 3 Work Practices

Considerations:

- Physical work area
- Biosafety cabinet
- Personal protective equipment

BSL 3 Work Practices in BSC

- Prior to start of work
  - Document operating conditions
  - Absorbent pad on work surface
  - Load with necessary supplies
- Work 4 -6 inches within BSC

BSL 3 Work Practices in BSC

- At completion of work
  - Disinfect all items prior to removal from BSC, including outside of plates and tube media
  - Tape or Parafilm plates closed &/or place in secure carrier
  - Remove outer pair of gloves (**without removing hands from BSC**) & place gloves in biowaste container **in BSC**
  - Remove cultures and place in incubator
  - Disinfect BSC

Risk Assessment

- Hazard identification
- Exposure assessment
- Dose-response assessment
- Risk characterization
- Review the risk assessment

Hazard identification

What are the principle hazardous characteristics of the agent?

- Capability to infect and cause disease in a susceptible human or animal host
- Virulence as measured by the severity of the disease it causes
- Availability of preventive measures and effective treatments for the disease

Exposure assessment

What are the principle hazardous characteristics of the laboratory procedures?

- Lab procedure characteristics
- Where can we get this information?
- What is the impact on aerosol generation?

Dose-Response Assessment

Ask these questions:

- What is the appropriate biosafety level? Do additional precautions need to be added?
- Use information gained in part one and part two to make preliminary decision

Risk Characterization

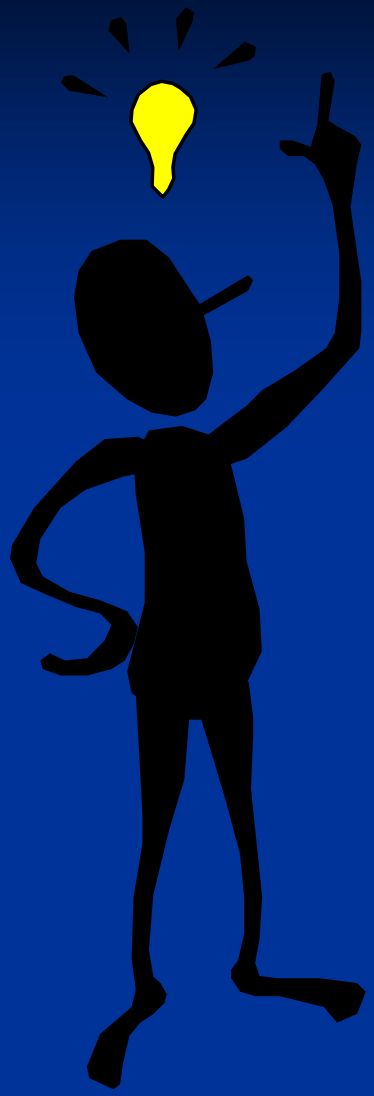
Evaluate staff proficiency

and

the risk of exposure

Review the risk assessment

Do the Biosafety Officer, Subject Matter Experts, Biosafety Committee, and Lab Administration agree with the decisions?



NOW

Let's take a look at a clinical microbiology lab case study

Investigation

Were There Biosafety Issues?

Contact Information

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References

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